

SPECIFICATION

MODEL NO.	TFC-S9700RTWV35TR-016
TYPE	LCD MODULE, 800(RGB) * 480 PIXELS

☒ **Preliminary Specification**

☐ **Final Specification**

TFC			CUSTOMER
PREPARED	CHECKED	APPROVED	APPROVED
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RECORDS OF REVISION

REV.	DATE	Page	DESCRIPTION OF CHANGES
A	2010.06.01		First Release

CONTENT

1. GENERAL SPECIFICATION.....	4
2 . BLOCK DIAGRAM.....	5
3. MECHANICAL DRAWING.....	6
4. INTERFACE ASSIGNMENT.....	7
5. ELECTRICAL SPECIFICATION.....	9
5.1. APPLICATION CIRCUIT.....	9
5.2. TFT LCD Module.....	9
5.3. AC CHARACTERISTICS.....	10
5 .4. TIMING DIAGRAM OF INTERFACE SIGNAL.....	10
5.5. POWER SEQUENCE.....	12
5.6. GAMMA CIRCUIT.....	13
5.7. BACKLIGHT SPECIFICATION.....	14
6. TOUCH PANEL SPECIFICATION.....	15
6.1. ELECTRICAL CHARACTERISTICS.....	15
6.2. OPTICAL CHARACTERISTICS.....	15
6.3. MECHANICAL CHARACTERISTICS.....	15
6.4. TOUCH PANEL CIRCUIT BLOCK.....	17
6.5. PROPOSAL OF MOBILE PHONE DESIGN.....	18
7. OPTICAL CHARACTERISTICS.....	19
8. RELIABILITY TESTS.....	24
9. PACKAGE DRAWING.....	25
10. INSPECTION STANDARDS(Base on MIL-STD-105E).....	26
11. PRECAUTIONS.....	29
11.1. HANDLING.....	29
11.2. STORAGE.....	29
11.3. SAFETY.....	29
12. LIMITED WARRANTY.....	29

1. GENERAL SPECIFICATION

1.1 Description

The TFC-S9700RTWV35TR-016 is a color active matrix Thin Film Transistor (TFT) Liquid Crystal Display (LCD) that uses amorphous silicon(a-Si) TFT as a switching device. This model is composed of a single 7.0(16:9) inches transmissive type main TFT-LCD panel. The resolution of the panel is 800 (RGB x 480) pixels and can display up to 16.7M color.

1.2 Feature

- TM type for main TFT-LCD panel
- 24bit (8bit/8bit/8bit) or 18bit (6bit/6bit/6bit) in dither mode
- One backlight with 27 white LED
- Up/Down, Left/Right reversion selection
- Full, Normal (Still), Partial, Deep Standby mode are available

1.3 Application

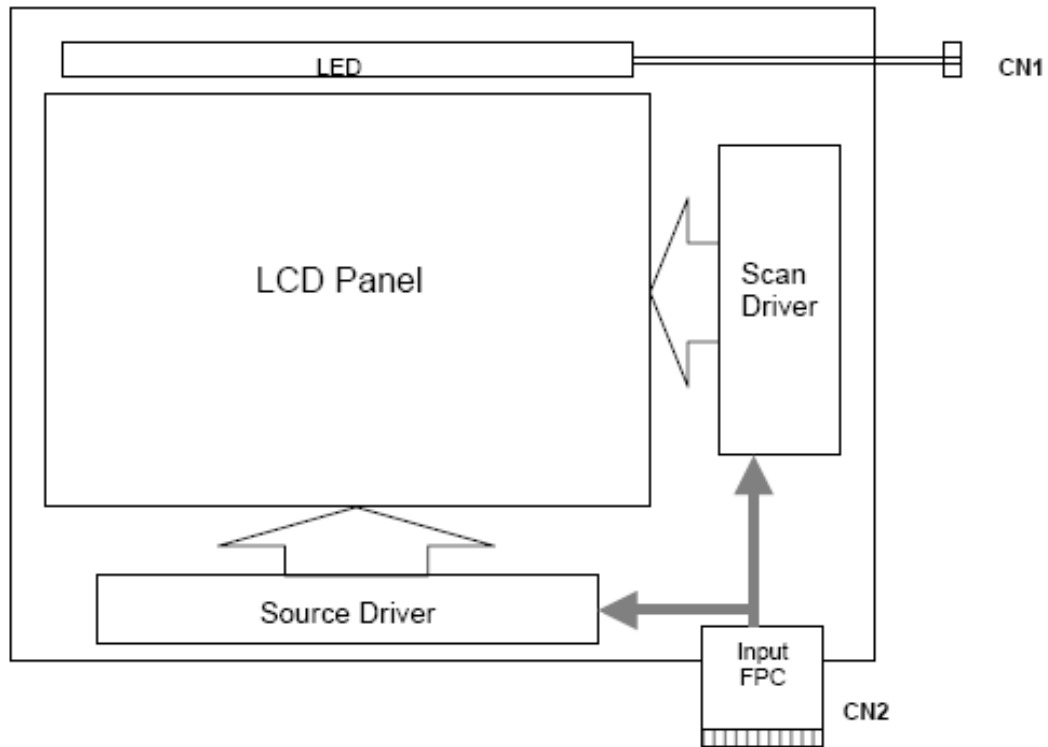
- Display terminals for digital product

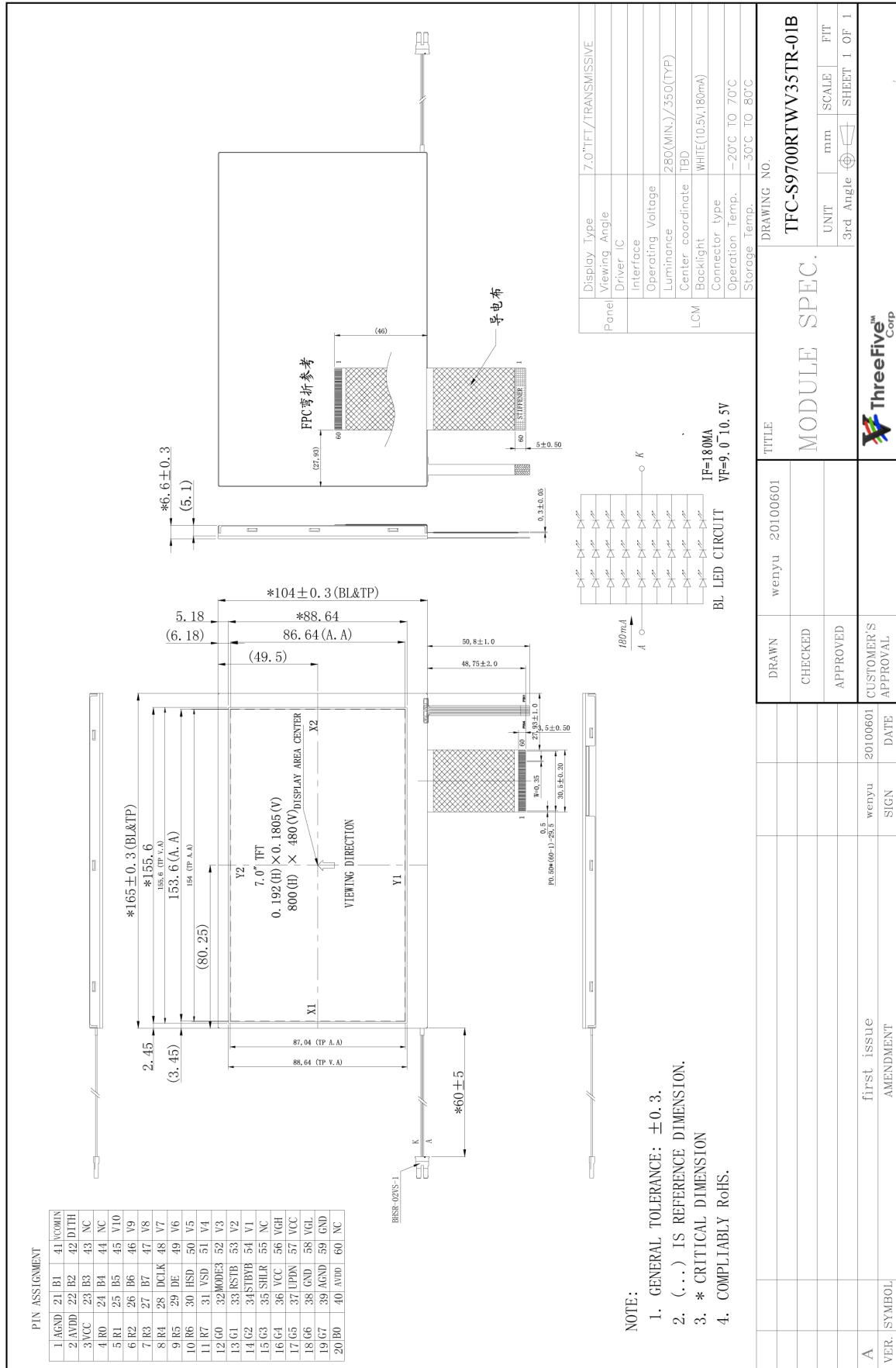
1.4 General Specification

No. Item	Specification	Unit	Remark
1	LCD Size	7(digital)	inch -
2	Panel Type	a-Si TFT active matrix	- -
3	Resolution	800 x (RGB) x 480	pixel -
4	Display Mode	Normally white, Transmissive	- -
5	Display Number of Colors	16.7M(24bit) or 262K(18bit)	- -
6	Viewing Direction	6 o'clock(Peak CR)	- Note
7	Contrast Ratio	500(Typ)	- -
8	Luminance	350(Typ)	cd/m ² -
9	Module Size	165.0(W) x 104.0(L) x 6.6(T)	mm Note
10	Panel Thickness	1.69	mm
11	Panel Surface Treatment	AG	
12	Active Area	153.6(W) x 86.64(L)	mm Note
13	Pixel Pitch	0.192(W) x 0.1805(L)	mm -
14	Weight	156.8 (Typ.)	g -
15	Light Source	27 LEDs White	- -
16	Interface	RGB 24bit	- -
17	Operating Temperature	-20~70	°C -
18	Storage Temperature	-30~80	°C -

Note: Please refer to the mechanical drawing.

2. BLOCK DIAGRAM



3. MECHANICAL DRAWING


4. INTERFACE ASSIGNMENT

4.1 TFT LCD Module

CN2 (Input signal): FPC Down Connector, (FH28-60S-0.5SH (HIROSE), 60pin,pitch = 0.5mm)

PIN NO.	SYMBOL	I/O FUNCTION	DESCRIPTIONS
1	AGND	P	Analog Ground
2	AVDD	P	Analog Power
3	VCC	P	Digital Power
4	R0	I	Data Input(LSB)
5	R1	I	Data Input
6	R2	I	Data Input
7	R3	I	Data Input
8	R4	I	Data Input
9	R5	I	Data Input
10	R6	I	Data Input
11	R7	I	Data Input(MSB)
12	G0	I	Data Input(LSB)
13	G1	I	Data Input
14	G2	I	Data Input
15	G3	I	Data Input
16	G4	I	Data Input
17	G5	I	Data Input
18	G6	I	Data Input
19	G7	I	Data Input(MSB)
20	B0	I	Data Input(LSB)
21	B1	I	Data Input
22	B2	I	Data Input
23	B3	I	Data Input
24	B4	I	Data Input
25	B5	I	Data Input
26	B6	I	Data Input
27	B7	I	Data Input(MSB)
28	DCLK	I	Clock input
29	DE	I	Data Enable signal
30	HSD	I	Horizontal sync input. Negative polarity
31	VSD	I	Vertical sync input. Negative polarity
32	MODE3	I	DE/SYNC mode select .normally pull high H:DE mode. L:HSD/VSD mode
33	RSTB	I	global reset pin.Active low to enter reset state.suggest to connecting with an RC reset circuit for stability .normally pull high.
34	STBYB	I	standby mode,normally pull high STBYB="1",normal operation STBYB="0",timming control ,sorce driver will turn off,all output are high-Z

35	SHLR	I	Source right or left sequence control.SHLR="L",shift left:last data=S1<-S2...S1200=first data SHLR="H",shift right:first data=S1->SS2...S1200=last data
36	VCC	P	Digital Power
37	UPDN	I	gate up or down scan control. UPDN="L" , DOWN shift : G1->G2...->G480 ; UPDN="H", up shift: G1<-G2...<-G480
38	GND	P	Digital Ground
39	AGND	P	Analog Ground
40	AVDD	P	Analog Power
41	VCOMin	I	For external VCOM DC input(Optional)
42	DITH	I	Dithering setting DITH="H" 6bit resolution (last 2 bits of input data turncated) DITH="L" 8bit resolution (default setting)
43	NC	-	Not connect
44	NC	-	Not connect
45	V10	P	Gamma correction voltage reference
46	V9	P	Gamma correction voltage reference
47	V8	P	Gamma correction voltage reference
48	V7	P	Gamma correction voltage reference
49	V6	P	Gamma correction voltage reference
50	V5	P	Gamma correction voltage reference
51	V4	P	Gamma correction voltage reference
52	V3	P	Gamma correction voltage reference
53	V2	P	Gamma correction voltage reference
54	V1	P	Gamma correction voltage reference
55	NC	-	Not connect
56	VGH	P	Positive Power for TFT
57	VCC	P	Digital Power
58	VGL	P	Negative Power for TFT
59	GND	P	Digital Ground
60	NC	-	Not connect

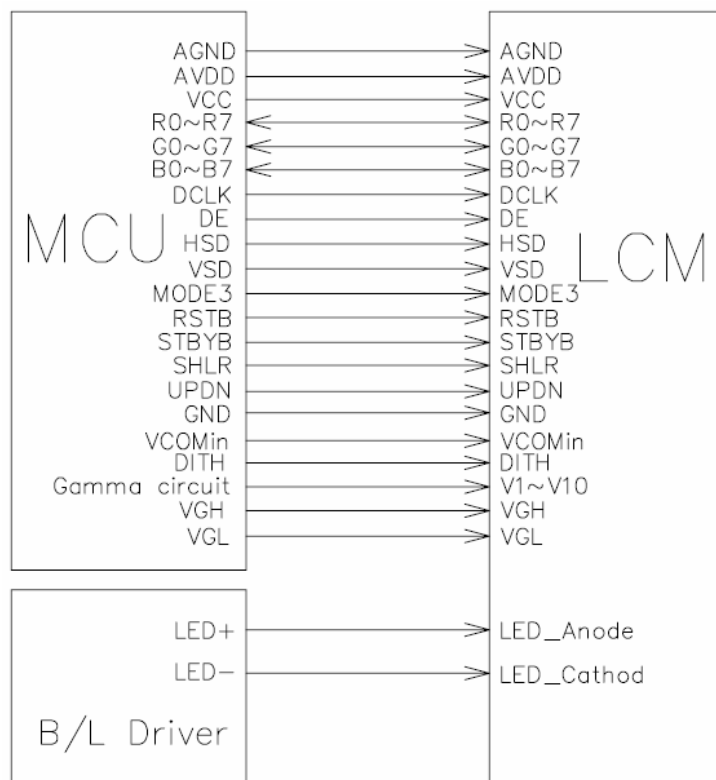
4.2 Back-Light Unit

CN1 BHSR-02VS-1

Terminal No.	Symbol	Function
1	VL (Red)	LED power supply (high voltage)
2	GL (Black)	LED power supply (low voltage)

5. ELECTRICAL SPECIFICATION

5.1. APPLICATION CIRCUIT



5.2. TFT LCD Module

Item Sy	mbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	2.7	3.0	3.5	V	
	V _{GH}	14.5	15	20	V	
	V _{GL}	-10	-7	-6.5	V	
	AV _{DD}	9.85	10	10.15	V	
VCOM	V _{CDC}	-	3.9	-	V	
Input signal Voltage	V _{IH}	0.7	-	Vcc	V	Note(1)
	V _{IL}	0	-	0.3 Vcc	V	
Current of power supply	IDD	-	5.426	-	mA	Vcc
	I _{ADD}	-	24.1	-	mA	AV _{DD} =10 V(Black)
	I _{GH}	-	0.128	-	mA	V _{GH} =15V
	I _{GL}	-	0.344	-	mA	V _{GL} = 7V
Input level of V1~V5	Vx	AVDD/2		AVDD-0.1	V	
Input level of V6~V10	Vx	0.1		AVDD/2	V	

Note (1): HSYNC, VSYNC, DE, Digital Data

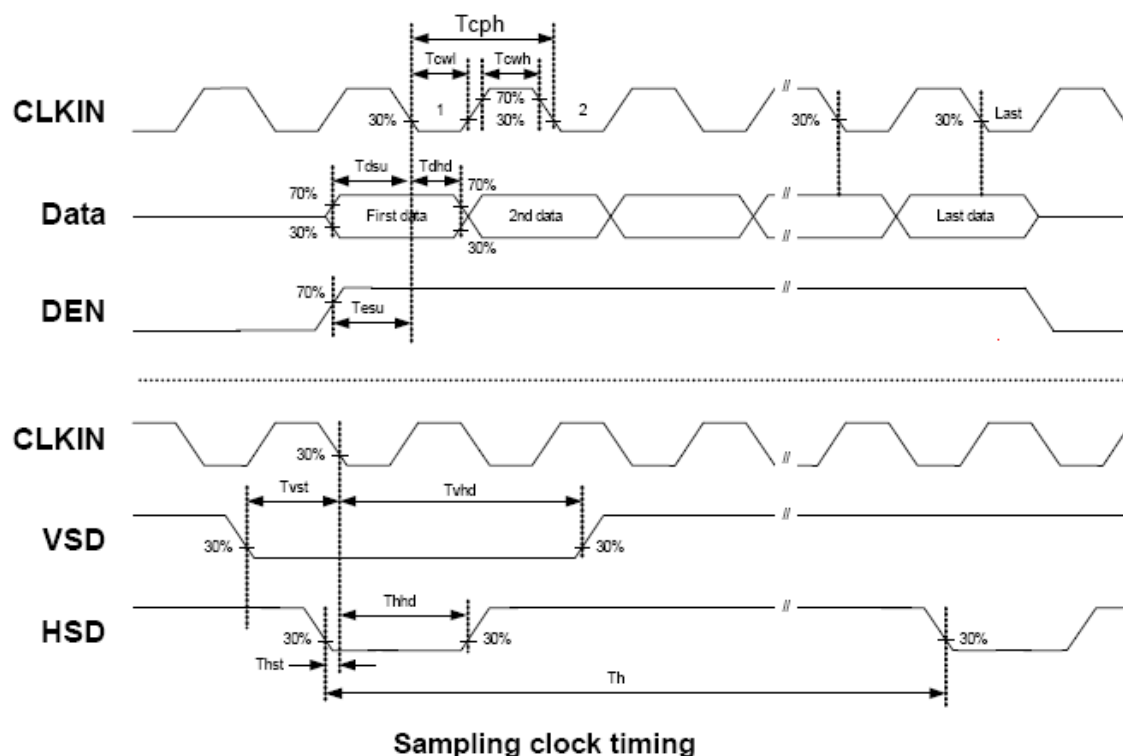
Note (2): Be sure to apply the power voltage as the power sequence spec.

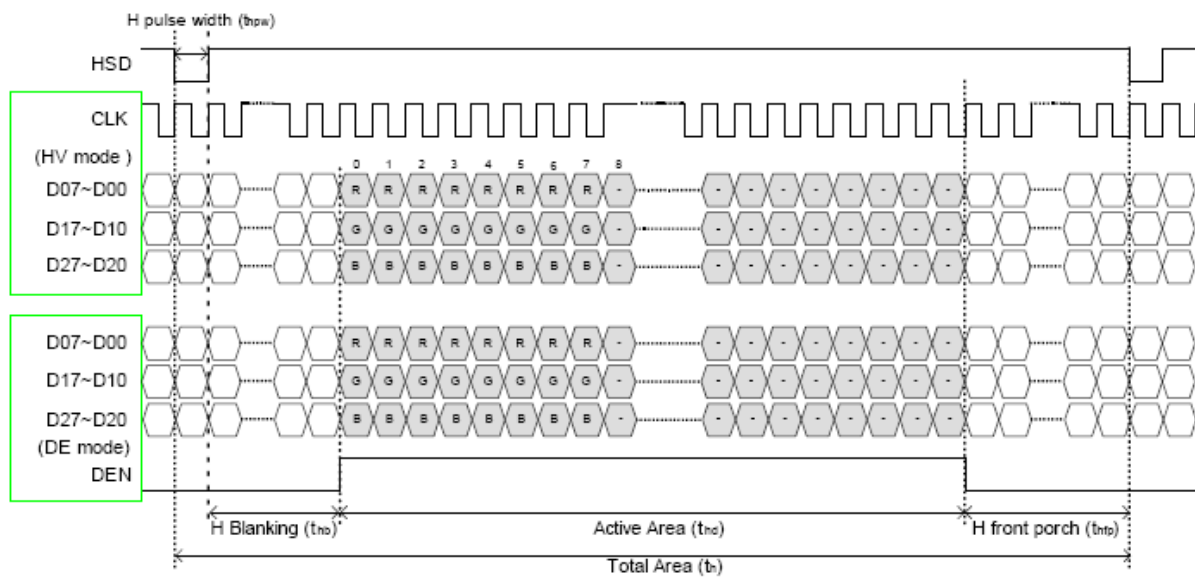
Note (3): DGND=AGND=0V.

5.3. AC CHARACTERISTICS

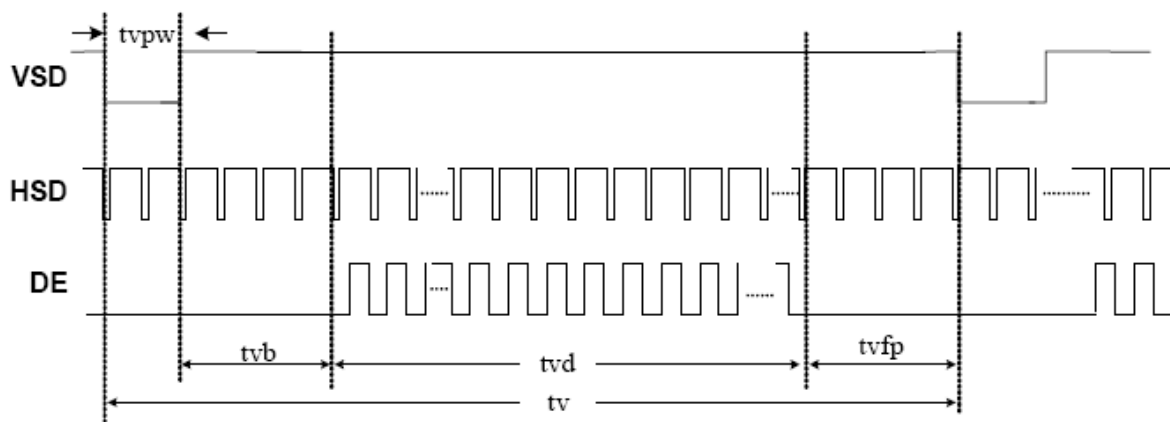
Item Sy	mbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle	time	25	-	-	ns	
DCLK frequency	fclk	-	30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8	-	-	ns	
VSD hold time	Tvhd	8	-	-	ns	
HSD setup time	Thst	8	-	-	ns	
HSD hold time	Thhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	
Data hold time	Tdhd	8	-	-	ns	
DE setup time	Tesu	8	-	-	ns	
DE hold time	Tehd	8	-	-	ns	
Horizontal display area	thd	-	800	-	Tcph	
HSD period time	th	-	928	-	Tcph	
HSD pulse width	thpw	1	48	-	Tcph	
HSD back porch	thb	-	40	-	Tcph	
HSD front porch	thfp	-	40	-	Tcph	
Vertical display area	tvd	-	480	-	th	
VSD period time	tv	-	525	-	th	
VSD pulse width	tvpw	-	3	-	th	
VSD back porch	tvb	-	29	-	th	
VSD front porch	tvfp	-	13	-	th	

5.4. TIMING DIAGRAM OF INTERFACE SIGNAL



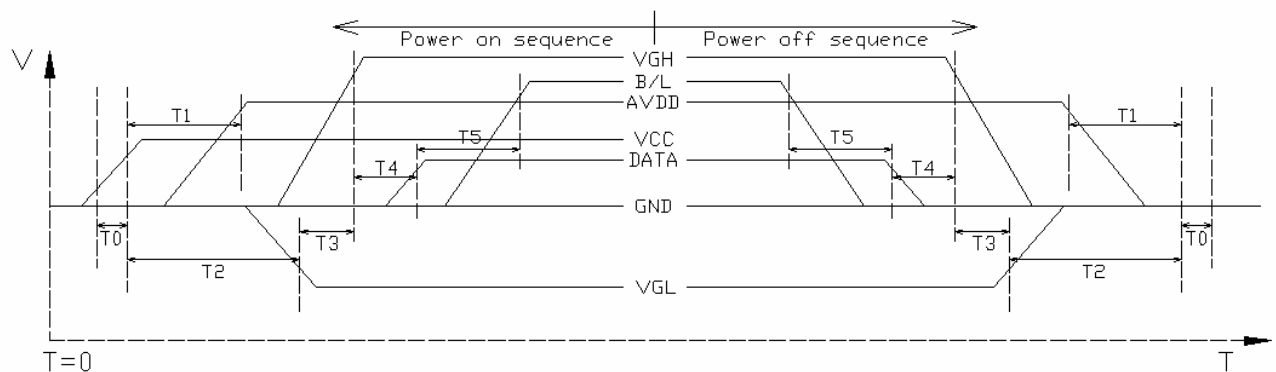


Horizontal display timing range

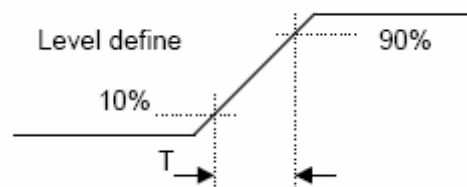


Vertical timing

5.5 POWER SEQUENCE



Item	Min.		Typ.	Max.	Unit
T0	0.5		-	20	msec
T1	16		-	-	msec
T2	20		-	-	msec
T3	10		-	-	msec
T4	10		-	50	msec
T5	50		-	-	msec

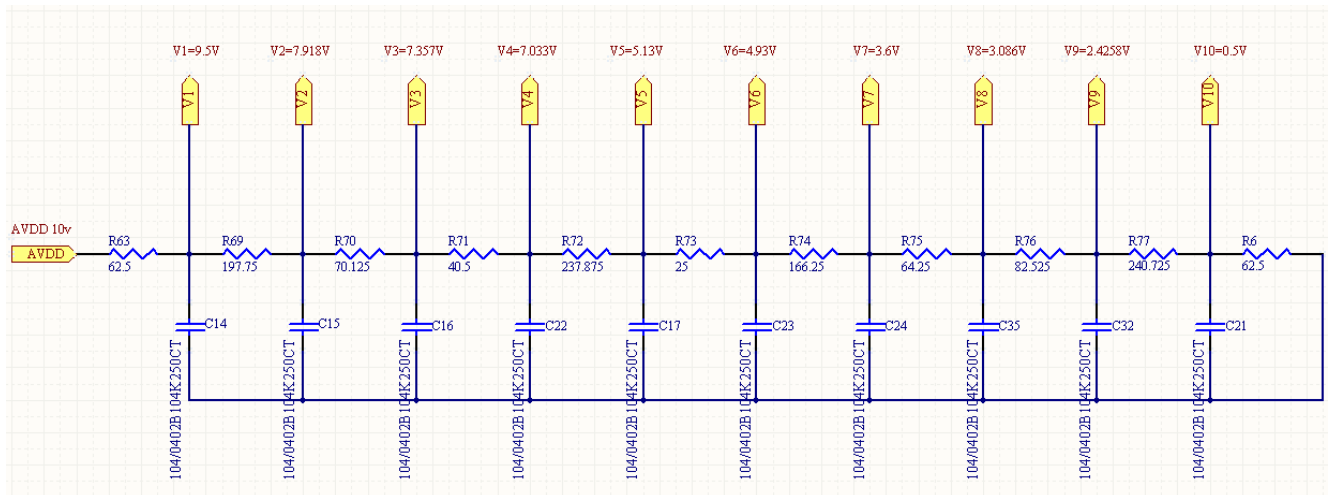


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

Notes: Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE MODE, RSTB, STBYB, SHLR, UPDN, DITH

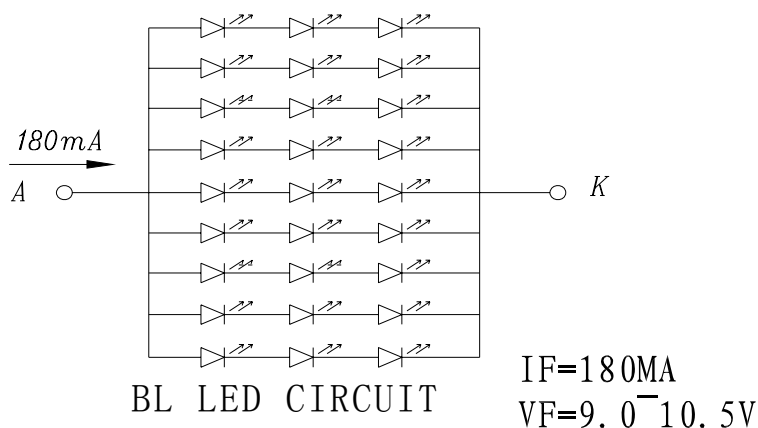
5.6 GAMMA CIRCUIT



**** Suggested Gamma Circuit. ****

5.7. BACKLIGHT SPECIFICATION

5.7.1 BACKLIGHT CIRCUIT



5.7.2 ABSOLUTE RATINGS

PARAMETER SYMBOL		SPECIFICATIONS	UNIT
POWER DISSIPATION	P_D	180×10.5	mW
FORWARD CURRENT (Single Chip)	I_{Fm}	20	mA
REVERSE VOLTAGE (Single Chip)	V_R	5	V
OPERATION TEMPERATURE	T_{OPR}	$-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$	$^{\circ}\text{C}$
STORAGE TEMPERATURE	T_{STG}	$-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$	$^{\circ}\text{C}$

5.7.3 ELECTRICAL CHARACTERISTICS

($T=25^{\circ}\text{C}$)

PARAMETER SYMBOL		CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
FORWARD VOLTAGE (Single Chip)	V_F	$I_F=20\text{mA}$	3.0	3.3	3.5	mA
Operating LED life time	Hr	20,000	—	—	Hour	(1)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25 \pm 3^{\circ}\text{C}$, typical I_L value indicated in the above table until the brightness becomes less than 50%.

6. TOUCH PANEL SPECIFICATION

6.1. ELECTRICAL CHARACTERISTICS

Item	Value			Unit	Remark
	Min. T	yp.	Max.		
Linearity	-1.5	-	+1.5	%	After environment and life test
Terminal Resistance	200	-	1200	Ω	X(Film side)
	100	-	800	Ω	Y(Glass side)
Insulation resistance	20	-	-	MΩ	DC 25V 1min
Operating Voltage	-	5		V	DC

6.2. OPTICAL CHARACTERISTICS

Item	Value			Unit	Remark
	Min. T	yp.	Max.		
Response Time	-	-	10	ms	100kΩ pull-up
Light Transparency	80	-	-	%	-

6.3. MECHANICAL CHARACTERISTICS

Item	Value			Unit	Remark
	Min. T	yp.	Max.		
Active Force	70	-	120	g	Note1
Surface Hardness	3	-	-	H	-
Pen Sliding Durability	100,000	-	-	time	Note 2
Hitting Durability	1,000,000	-	-	time	Note 3

Note 1: Do not operate it with a stylus other than a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

Note 2: Test Condition:

End shape: R0.8mm and R8.0mm,

Resistance between X and Y axis must be equal or lower than 2KΩ, the test voltage =DC5V.

Note 3: Measurement For Linearity. (After environment and life test)

-Load: 150g with End shape R0.8 mm Polyacetal resin.

-Measuring area: 1.0mm inside the edge of touch panel active area, pitch 5mm. (Fig. 1)

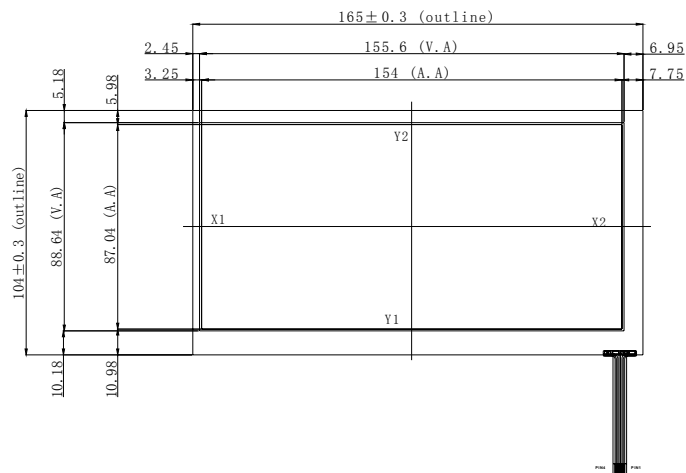


Fig. 1 Measuring area for Linearity

Note 4: Measurement for surface area.

- Scratch 100,000 times of straight line on the screen with a stylus which is changed every 20,000 times. One time is defined in one direction, strike one time, and then in the reverse direction strike one time that defined 2nd time.
- Force: 150gf.
- Speed: 150mm/sec.
- Writing Length: 25mm.
- Stylus: R0.8 polyacetal tip.
- Measuring area: 2.0mm inside the edge of touch panel active area, any line. (Fig. 2)
- Result: the SPEC of Electrical Characteristics pass.

Note 5: Hit 1,000,000 times on the screen with a R0.8mm Polyacetal resin By stylus tapping at same points.

- Force: 250gf.
- Speed: 5times/sec.
- Measuring area: 2.0mm inside the edge of touch panel active area, any point. (Fig. 2)
- Result: The SPEC of Electrical Characteristics pass.

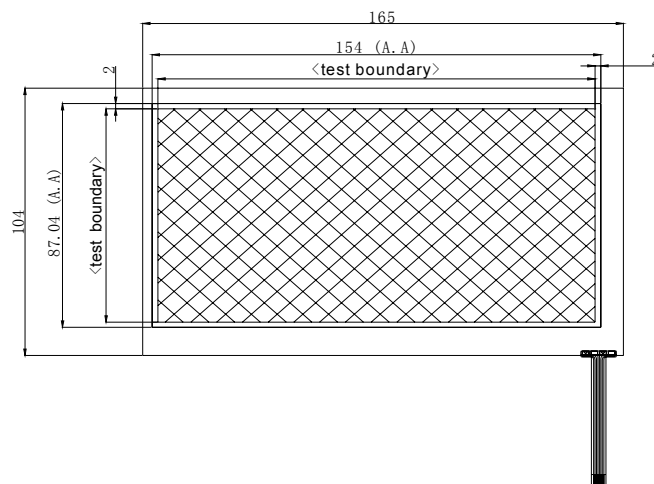
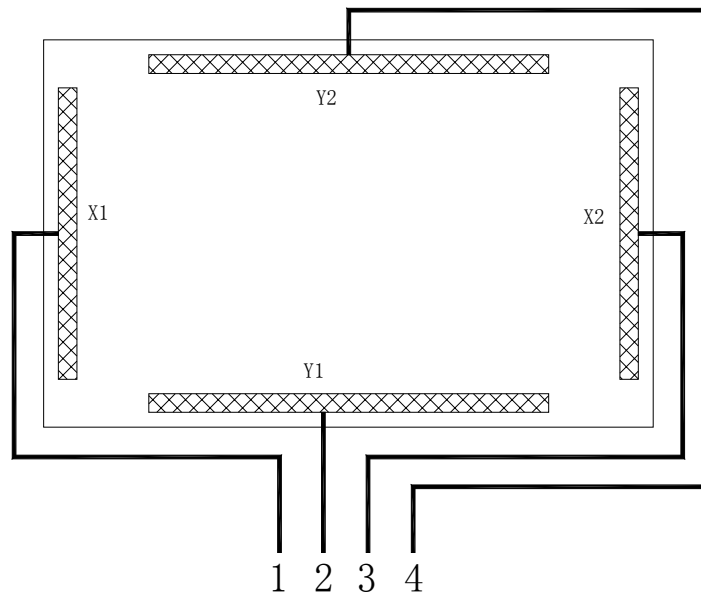
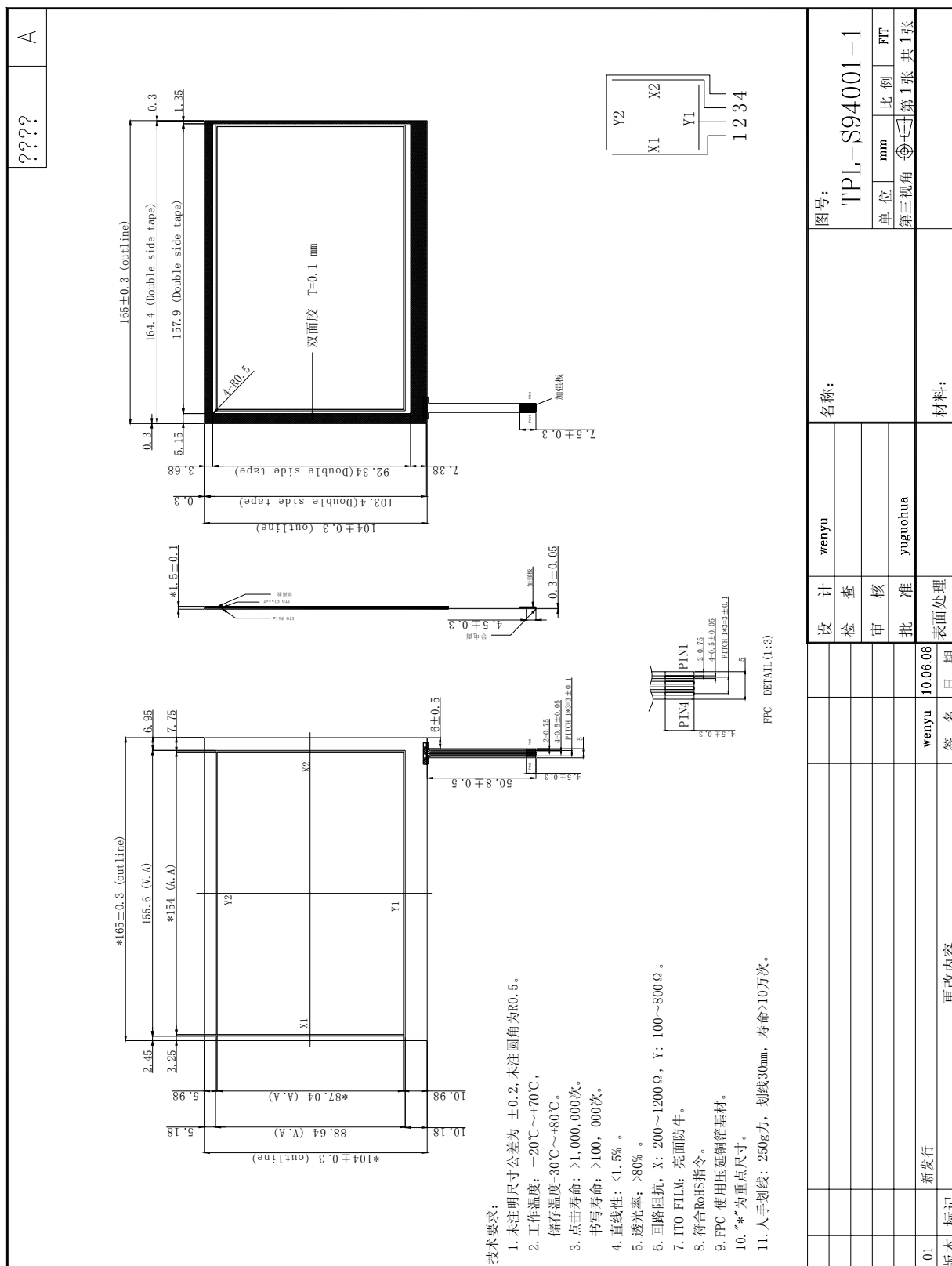


Fig. 2 Measuring area for Pen Sliding & Hitting Durability

6.4. TOUCH PANEL CIRCUIT BLOCK



6.5. PROPOSAL OF MOBILE PHONE DESIGN



Note 1: "Top enclosure" is the top case of mobile phone.

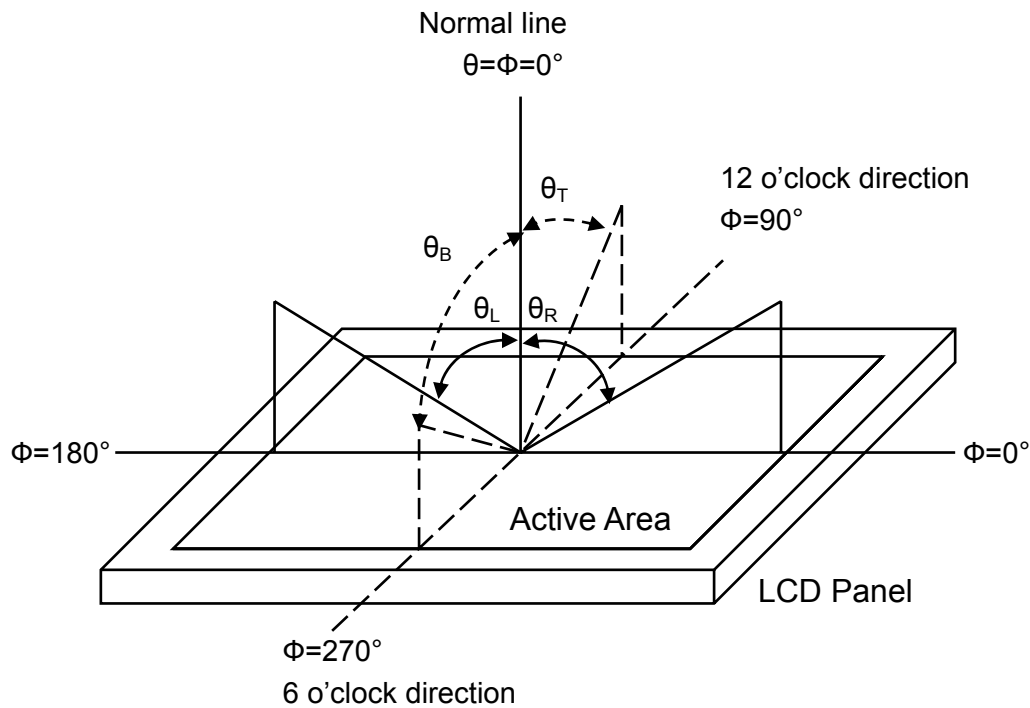
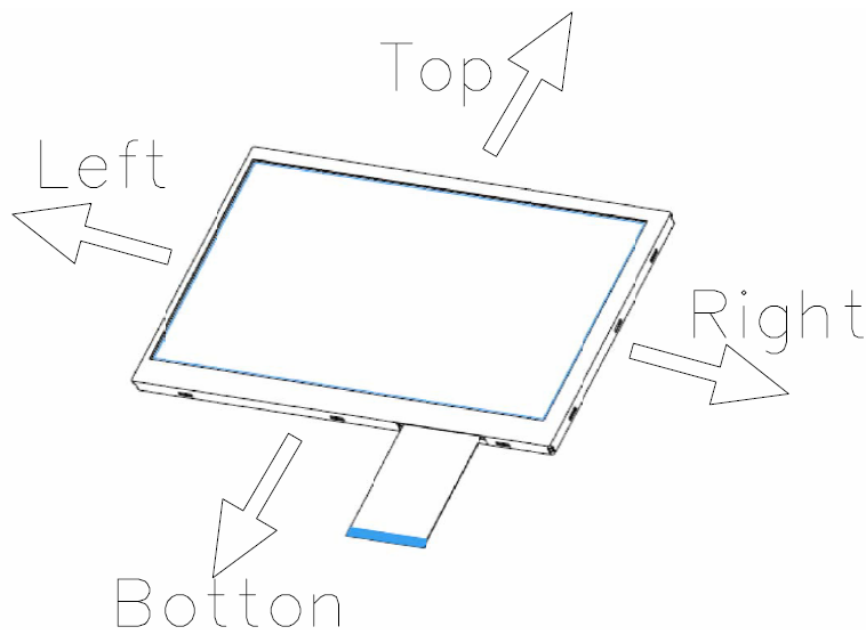
Note 2: "Window Area" is the opening area of top enclosure of the mobile phone, we suggest customers design it following the drawing and there should be no defect in the LCD module within the area.

Note 3: "Cushion Area" is the cushion customer use between top enclosure and LCM, we suggest customers design it following the drawing and the cushion should not press the TP V/A.

7. OPTICAL CHARACTERISTICS

(T_a=+25, VCC=+3.3V)

Item		Symbol	Condition	Values			Unit	Remark
				Min.	Typ.	Max.		
Viewing Angle Range	Left	θ_L	$CR \geq 10$	60	70	-	degree	Note 1,2
	Right	θ_R		60	70	-		
	Top	Φ_T		40	50	-		
	Botto	Φ_B		50	60	-		
Response Time		$T_{on} + T_{off}$	Normal $\theta = \phi = 0^\circ$	-	25	40	ms	Note 2,3
Contrast Ratio		CR	Normal $\theta = \phi = 0^\circ$	400	500	-	-	Note 2,4
Luminance		L	Normal $\theta = \phi = 0^\circ$	-	350	-	cd/m ²	Note 2,5
Color Chromaticity (CIE1931)	White	W_x	Normal $\theta = \phi = 0^\circ$	-	0.30	-	-	Note 2,6
		W_y		-	0.34	-		
	Red	R_x		-	-	-		
		R_y		-	-	-		
	Green	G_x		-	-	-		
		G_y		-	-	-		
	Blue	B_x		-	-	-		
		B_y		-	-	-		
Color Gamut		NTSC	CIE1931	-	47	-	%	-
Luminance Uniformity		U_L	Normal $\theta = \phi = 0^\circ$	70	-	-	%	Note 2,7
Flicker			Normal $\theta = \phi = 0^\circ$	Not visible			-	Note 8
Crosstalk			Normal $\theta = \phi = 0^\circ$	Not visible			-	Note 9

Note 1: Definition of viewing angle range

Fig. 1 Definition of viewing angle

Fig. 2 Definition of viewing angle for display
Note 2: Definition of optical measurement system

The optical characteristics should be measured in a dark room with ambient temperature $T_a = +25^\circ\text{C}$. The optical properties are measured at the center point of the LCD screen after 5 minutes operation. (Equipment: Photo detector TOPCON BM-5AS Field of view: 1° /Height: 500mm.)

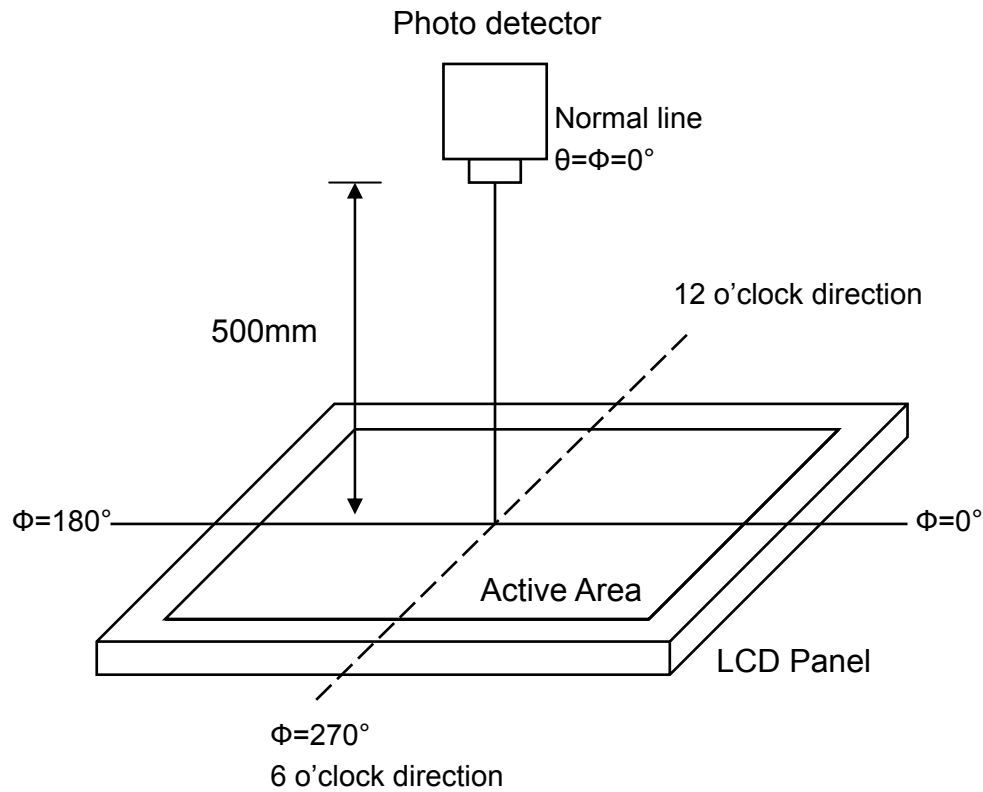


Fig. 3 Optical measurement system setup

Note 3: Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{on}) is the time between photo detector output intensity changed from 90% to 10%, and fall time (T_{off}) is the time between photo detector output intensity changed from 10% to 90%.

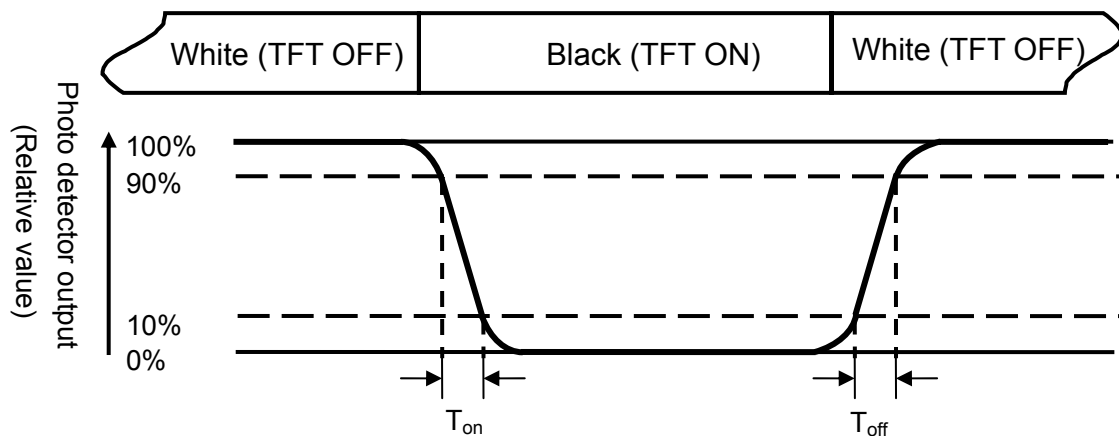


Fig. 4 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of luminance

Measured at the center area of the panel when LCD panel is driven at “white” state.

Note 6: Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD when panel is driven at “White”, “Red”, “Green” and “Blue” state respectively.

Note 7: Definition of luminance uniformity

To test for uniformity, the tested area is divided into 3 rows and 3 columns. The measurement spot is placed at the center of each circle as below.

$$\text{Luminance Uniformity (U}_L\text{)} = \frac{L_{\min}}{L_{\max}}$$

L-----Active area length

W----- Active area width

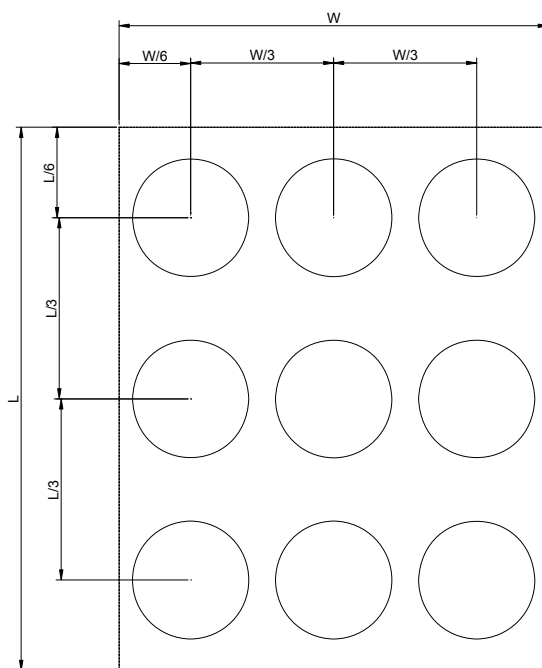


Fig. 5 Definition of luminance uniformity

L_{\min} : The measured minimum luminance of all measurement position.

L_{\max} : The measured maximum luminance of all measurement position.

Note 8: Definition of Flicker

Flicker is the pattern usually used to describe the visual sensation produced by a rapidly varying light intensity. There should be no visible flicker in normal direction of the display when the following figure are loaded. The figure is composed of interlaced black and white lines.

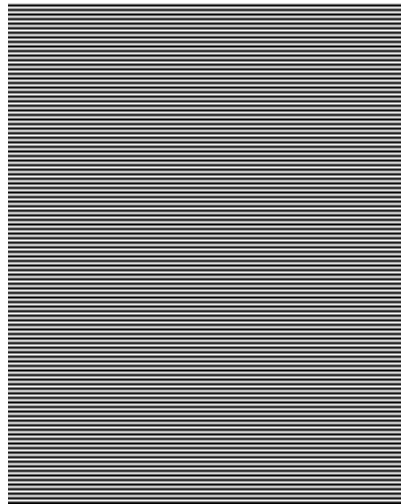


Fig.6 Flicker checker pattern

Note 9: Definition of crosstalk

There should be no visible in normal direction of the display when the following figures are loaded.

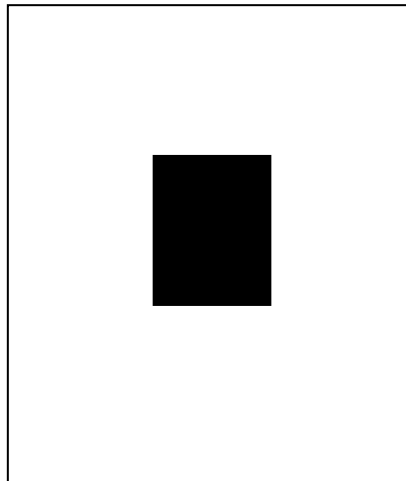


Fig.7 Crosstalk checker pattern

8. RELIABILITY TESTS

ITEM CONDITION		CRITERION
Operating Temperature Test	High Temperature: +70 °C±3°C, 72 hrs	No defects in display and operational functions
	Low Temperature: -20 °C±3°C, 72 hrs	
Storage Temperature Test	High Temperature: +80 °C±3°C, 120 hrs	No defects in display and operational functions
	Low Temperature: -30 °C±3°C, 120 hrs	
Humidity Endurance Test	40 °C±3°C, 90%±3%RH, 72 hrs	No defects in display and operational functions
Thermal Shock Test	-20 °C (30mins) ←+5 °C (5mins)→ +70 °C (30mins) 10 cycles	No defects in display and operational functions
Vibration Resistance Test	Operating Time: thirty minutes exposure for each direction (X,Y,Z) Sweep Frequency:10~55Hz (1 min) Amplitude: 1.5mm	No defects in display and operational functions
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	No defects in display and operational functions
Package Vibration Test	Random Vibration : 0.015G ² /Hz from 5-200Hz, -6dB/Octave from 200-500Hz 1 hour for each direction of X. Y. Z. (3 hours for total)	No defects in display and operational functions
Package Drop Test	Height :72cm(Weight ≤ 10kg); 60cm(Weight ≥ 10kg) 1 corner, 3 edges, 6 surfaces	No defects in display and operational functions
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	No defects in display and operational functions

NOTE:

- 1) The samples must be free from defect before test, must be restored at room condition at least for 2 hours after reliability test before any inspection.
- 2) Before test the function of TP, the sample must be placed in room temperature for 24hrs after RA test.

9. PACKAGE DRAWING**TBD**

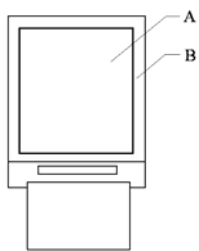
10. INSPECTION STANDARDS(Base on MIL-STD-105E)

10.1. BASIC CONDITIONS FOR INSPECTION

9.1.1. Definition of inspection area

A Area: Viewing area

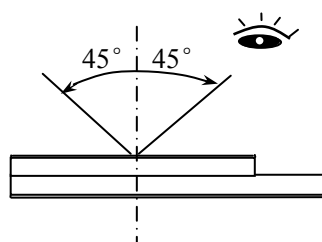
B Area: Outside viewing area



10.1.2. The test must be under 20W fluorescent light, and the distance must be at 30cm.

10.1.3. The test direction of appearance inspection is base on about around 45° of vertical line.

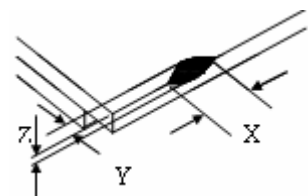
And the test direction of electrical inspection is base on the view direction definition of the drawing.



10.2. INSPECTION ITEMS AND STANDARDS FOR POWER-OFF CONDITIONS

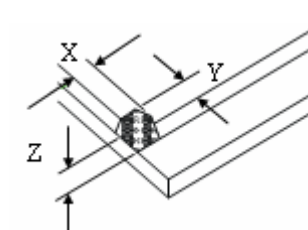
No	Item Criterion	AQL
1	Dimensions	Dimensions out of the specification
2	Glass crack	2.50

1、 General crack



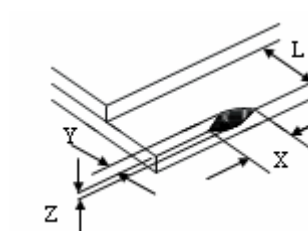
X	Y	Z
disregard	≤ 1.0 mm	≤ T

2、 Corner



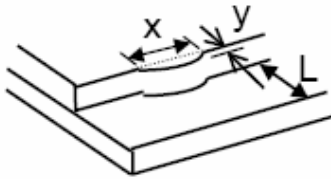
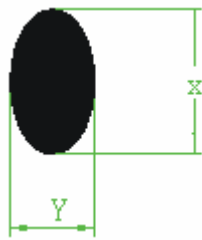
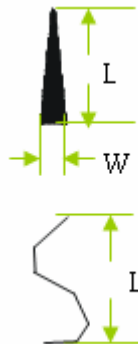
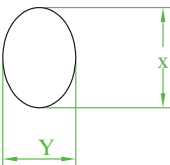
X	Y	Z
≤ 3.0 mm	≤ 3.0 mm	≤ T

3、 Contact pad crack



X	Y	Z
≤ 3.0 mm	≤ L/3	≤ T

Crack at two sides of lead terminals should not cover patterns

		<p>and alignment mark.</p> <p>4、Substrate protuberance and internal crack</p> <div>  <table border="1"> <tr> <td>X</td> <td>Y</td> </tr> <tr> <td>disregard</td> <td>≤ 0.3</td> </tr> </table> </div> <p>Should not influence outline dimension and assembling.</p>	X	Y	disregard	≤ 0.3											
X	Y																
disregard	≤ 0.3																
3	<p>Black dot White dot</p> <div>  <table border="1"> <tr> <th rowspan="2">D</th> <th colspan="2">Acceptable Condition</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> <tr> <td>D≤0.2</td> <td>disregard</td> <td rowspan="4">disregard</td> </tr> <tr> <td>0.2<D≤0.3</td> <td>2</td> </tr> <tr> <td>0.3<D≤0.5</td> <td>1</td> </tr> <tr> <td>0.5<D</td> <td>0</td> </tr> </table> </div> <p>X: long diameter Y: shot diameter D: average of diameter D=(X+Y)/2</p>	D	Acceptable Condition		A Area	B Area	D≤0.2	disregard	disregard	0.2<D≤0.3	2	0.3<D≤0.5	1	0.5<D	0	2.50	
D	Acceptable Condition																
	A Area	B Area															
D≤0.2	disregard	disregard															
0.2<D≤0.3	2																
0.3<D≤0.5	1																
0.5<D	0																
4	<p>Line defect</p> <div>  <table border="1"> <tr> <th rowspan="2">Length</th> <th rowspan="2">Width</th> <th colspan="2">Acceptable Condition</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> </table> </div>	Length	Width	Acceptable Condition		A Area	B Area	2.50									
Length	Width			Acceptable Condition													
		A Area	B Area														
5	<p>Polarizer bubble</p> <div>  <table border="1"> <tr> <th rowspan="2">D</th> <th colspan="2">Acceptable Condition</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> <tr> <td>D≤0.2</td> <td>disregard</td> <td rowspan="4">disregard</td> </tr> <tr> <td>0.2<D≤0.5</td> <td>3</td> </tr> <tr> <td>0.5<D≤1.0</td> <td>2</td> </tr> <tr> <td>1.0<D</td> <td>0</td> </tr> </table> </div>	D	Acceptable Condition		A Area	B Area	D≤0.2	disregard	disregard	0.2<D≤0.5	3	0.5<D≤1.0	2	1.0<D	0	2.50	
D	Acceptable Condition																
	A Area	B Area															
D≤0.2	disregard	disregard															
0.2<D≤0.5	3																
0.5<D≤1.0	2																
1.0<D	0																
6	<p>Silicon glue</p> <p>The area of painting silicon glue must cover the ITO circuit.</p>	2.50															

10.3. INSPECTION ITEMS AND ACCEPTANCE STANDARDS FOR DISPLAYS (POWER-ON)

No. Item		Criterion		AQL																			
1	Electrical defect	<table><tr><td>Segment missing</td><td>Not allowed</td></tr><tr><td>Segment short</td><td>Not allowed</td></tr><tr><td>Non-display</td><td>Not allowed</td></tr></table>		Segment missing	Not allowed	Segment short	Not allowed	Non-display	Not allowed	0.65													
Segment missing	Not allowed																						
Segment short	Not allowed																						
Non-display	Not allowed																						
2	Contrast Variation	<table><tr><td>Size</td><td>Acceptable QTY</td></tr><tr><td>LCD size ≤ 3”</td><td>2</td></tr><tr><td>LCD size > 3”</td><td>3</td></tr></table>		Size	Acceptable QTY	LCD size ≤ 3”	2	LCD size > 3”	3	2.50													
Size	Acceptable QTY																						
LCD size ≤ 3”	2																						
LCD size > 3”	3																						
3	Black dot White dot	<p>X: long diameter Y: shot diameter D: average diameter $D=(X+Y)/2$</p>	<table><tr><th rowspan="2">D</th><th colspan="2">Acceptable QTY</th></tr><tr><th>A Area</th><th>B Area</th></tr><tr><td>D≤0.1</td><td>disregard</td><td rowspan="4">disregard</td></tr><tr><td>0.1<D≤0.2</td><td>2</td></tr><tr><td>0.2<D≤0.25</td><td>1</td></tr><tr><td>D>0.25</td><td>0</td></tr></table>	D	Acceptable QTY		A Area	B Area	D≤0.1	disregard	disregard	0.1<D≤0.2	2	0.2<D≤0.25	1	D>0.25	0	2.50					
D	Acceptable QTY																						
	A Area	B Area																					
D≤0.1	disregard	disregard																					
0.1<D≤0.2	2																						
0.2<D≤0.25	1																						
D>0.25	0																						
4	Line defect	<p>L: length W: width</p>	<table><tr><th rowspan="2">Length</th><th rowspan="2">Width</th><th colspan="2">Acceptable QTY</th></tr><tr><th>A Area</th><th>B Area</th></tr><tr><td>disregard</td><td>W≤0.02</td><td>disregard</td><td rowspan="4">disregard</td></tr><tr><td>L≤3</td><td>0.02<W≤0.03</td><td>2</td></tr><tr><td rowspan="2">L≤2.5</td><td>0.03<W≤0.05</td><td>2</td></tr><tr><td>W>0.05</td><td colspan="2">As round type</td></tr></table>	Length	Width	Acceptable QTY		A Area	B Area	disregard	W≤0.02	disregard	disregard	L≤3	0.02<W≤0.03	2	L≤2.5	0.03<W≤0.05	2	W>0.05	As round type		2.50
Length	Width	Acceptable QTY																					
		A Area	B Area																				
disregard	W≤0.02	disregard	disregard																				
L≤3	0.02<W≤0.03	2																					
L≤2.5	0.03<W≤0.05	2																					
	W>0.05	As round type																					

11. PRECAUTIONS

11.1. HANDLING

10.1.1. Polarizer Cleaning, Petroleum ether (or N-hexane) is recommended for cleaning the front/rear polarizers and reflectors, acetone, toluene and ethanol are not allowed to avoid damaging the surface.

10.1.2. Body grounding, must wear Anti-ESD wrist strap while pick up LCDs.

10.1.3. FPC Soldering, less than 300°C/3S, solder must be grounding on grounding bench.

10.1.4. If use electric Screwdriver to do assembly, screwdriver must be grounding.

11.2. STORAGE

10.2.1. Keep in a sealed polyethylene bag.

10.2.2. Keep in a dark place.

10.2.3. Keep in temperature between 0°C and 35°C.

NOT allowed at 70°C for more than 160 Hours, or at -20°C for more than 48 Hrs.

11.3. SAFETY

If liquid crystal leak out of a damaged glass cell, **DO NOT** put it in your mouth or touch eyes, if the liquid crystal touch your skin or clothes, please wash it off immediately using soap and water.

12. LIMITED WARRANTY

Unless otherwise agreed between TFC and customer, TFC will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with TFC LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects over specs must be returned to TFC within 30 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of TFC limited to repair and/or replacement on the terms set forth above. TFC shall not be responsible for any subsequent or consequential events.

12.1. RETURNING LCM UNDER WARRANTY – TERMS AND CONDITIONS

11.1.1. No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- Circuit modified in any way, including addition of components.

11.1.2. Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB's eyelet, conductors and terminals.